INDEX

Belfort, G. *See* Schonberg, Drew & Belfort

Bentley, B. J. & Leal, L. G. A computer-controlled four-roll mill for investigations of particle and drop dynamics in two-dimensional linear shear flows, 219–240

Bentley, B. J. & Leal, L. G. An experimental investigation of drop deformation and breakup in steady, two-dimensional linear flows, 241–283

Biggerstaff, M. I. *See* Koschmieder & Biggerstaff

Borenäs, K. & Lundberg, P. Rotating hydraulics of flow in a parabolic channel, 309–326

Boubnov, B. M. & Golitsyn, G. S. Experimental study of convective structures in rotating fluids, 503–531

Brevdo, L. *See* Merkine & Brevdo

Chikwendu, S. C. Calculation of longitudinal shear dispersivity using an N-zone model as $N \to \infty$, 19–30

Clarke, J. F. & Riley, N. Combustion theory: a report on Euromech 203, 409–414

Dombre, T., Frisch, U., Greene, J. M., Hénon, M., Mehr, A. & Soward, A. M. Chaotic streamlines in the ABC flows, 353–391

Drew, D. A. *See* Schonberg, Drew & Belfort

Elgar, S. & Guza, R. T. Nonlinear model predictions of bispectra of shoaling surface gravity waves, 1–18

Eltayeb, I. A. & Hassan, M. H. A. On hydromagnetic critical layers, 117–130

Frisch, U. *See* Dombre, Frisch, Greene, Hénon, Mehr & Soward

Golitsyn, G. S. *See* Boubnov & Golitsyn

Greene, J. M. *See* Dombre, Frisch, Greene, Hénon, Mehr & Soward

Guza, R. T. *See* Elgar & Guza

Hassan, M. H. A. *See* Eltayeb & Hassan

Helfrich, K. R. & Melville, W. K. On long nonlinear internal waves over slope–shelf topography, 285–308

Hénon, M. *See* Dombre, Frisch, Greene, Hénon, Mehr & Soward

Herbert, Th. Viscous fluid motion in a spinning and nutating cylinder, 181–198

Hinch, E. J. *See* Rallison & Hinch

Howison, S. D. Fingering in Hele-Shaw cells, 439–453.

Jansons, K. M. Moving contact lines at non-zero capillary number, 393–407

Johnson, A. D. *See* Ockendon, Ockendon & Johnson

Johnson, R. S. On the nonlinear critical layer below a nonlinear unsteady surface wave, 327–351

Kaneda, Y. The drag on a sparse random array of fixed spheres in flow at small but finite Reynolds number, 455–463

Koschmieder, E. L. & Biggerstaff, M. I. Onset of surface-tension-driven Bénard convection, 49–64

Krasny, R. A study of singularity formation in a vortex sheet by the point-vortex approximation, 65–93

INDEX

Belfort, G. *See* Schonberg, Drew & Belfort

Bentley, B. J. & Leal, L. G. A computer-controlled four-roll mill for investigations of particle and drop dynamics in two-dimensional linear shear flows, 219–240

Bentley, B. J. & Leal, L. G. An experimental investigation of drop deformation and breakup in steady, two-dimensional linear flows, 241–283

Biggerstaff, M. I. *See* Koschmieder & Biggerstaff

Borenäs, K. & Lundberg, P. Rotating hydraulics of flow in a parabolic channel, 309–326

Boubnov, B. M. & Golitsyn, G. S. Experimental study of convective structures in rotating fluids, 503–531

Brevdo, L. *See* Merkine & Brevdo

Chikwendu, S. C. Calculation of longitudinal shear dispersivity using an N-zone model as $N \to \infty$, 19–30

Clarke, J. F. & Riley, N. Combustion theory: a report on Euromech 203, 409–414

Dombre, T., Frisch, U., Greene, J. M., Hénon, M., Mehr, A. & Soward, A. M. Chaotic streamlines in the ABC flows, 353–391

Drew, D. A. *See* Schonberg, Drew & Belfort

Elgar, S. & Guza, R. T. Nonlinear model predictions of bispectra of shoaling surface gravity waves, 1–18

Eltayeb, I. A. & Hassan, M. H. A. On hydromagnetic critical layers, 117–130

Frisch, U. *See* Dombre, Frisch, Greene, Hénon, Mehr & Soward

Golitsyn, G. S. *See* Boubnov & Golitsyn

Greene, J. M. *See* Dombre, Frisch, Greene, Hénon, Mehr & Soward

Guza, R. T. *See* Elgar & Guza

Hassan, M. H. A. *See* Eltayeb & Hassan

Helfrich, K. R. & Melville, W. K. On long nonlinear internal waves over slope–shelf topography, 285–308

Hénon, M. *See* Dombre, Frisch, Greene, Hénon, Mehr & Soward

Herbert, Th. Viscous fluid motion in a spinning and nutating cylinder, 181–198

Hinch, E. J. *See* Rallison & Hinch

Howison, S. D. Fingering in Hele-Shaw cells, 439–453.

Jansons, K. M. Moving contact lines at non-zero capillary number, 393–407

Johnson, A. D. *See* Ockendon, Ockendon & Johnson

Johnson, R. S. On the nonlinear critical layer below a nonlinear unsteady surface wave, 327–351

Kaneda, Y. The drag on a sparse random array of fixed spheres in flow at small but finite Reynolds number, 455–463

Koschmieder, E. L. & Biggerstaff, M. I. Onset of surface-tension-driven Bénard convection, 49–64

Krasny, R. A study of singularity formation in a vortex sheet by the point-vortex approximation, 65–93

Leal, L. G. *See* Bentley & Leal

Lundberg, P. *See* Borenäs & Lundberg

Mehr, A. *See* Dombre, Frisch, Greene, Hénon, Mehr & Soward

Melander, M. V., Zabusky, N. J. & Styczek, A. S. A moment model for vortex interactions of the two-dimensional Euler equations. Part 1. Computational validation of a Hamiltonian elliptical representation, 95–115

Melville, W. K. *See* Helfrich & Melville

Merkine, L. & Brevdo, L. Boundary-layer separation of a two-layer rotating flow on a β-plane, 31–48

Miles, J. W. Resonant amplification of gravity waves over a circular sill, 169–179

Ockendon, H., Ockendon, J. R. & Johnson, A. D. Resonant sloshing in shallow water, 465–479

Ockendon, J. R. *See* Ockendon, Ockendon & Johnson

Rallison, J. M. & Hinch, E. J. The effect of particle interactions on dynamic light scattering from a dilute suspenson, 131–168

Rey de Luna, A. *See* Zamora & Rey de Luna

Riley, N. *See* Clarke & Riley

Schonberg, J. A., Drew, D. A. & Belfort, G. Viscous interactions of many neutrally buoyant spheres in Poiseuille flow, 415–426

Soward, A. M. *See* Dombre, Frisch, Greene, Hénon, Mehr & Soward

Styczek, A. S. *See* Melander, Zabusky & Styczek

Walker, J. S. Liquid-metal flow in a thin conducting pipe near the end of a region of uniform magnetic field, 199–217

Worster, M. G. Solidification of an alloy from a cooled boundary, 481–501

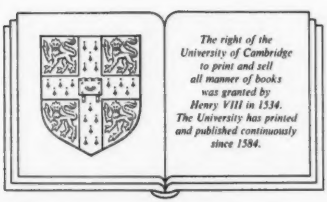
Zabusky, N. J. *See* Melander, Zabusky & Styczek

Zamora, M. & Rey de Luna, A. Energy of a system formed by a convective fluid and its container, 427–437

JOURNAL OF FLUID MECHANICS

VOLUME 167

JUNE 1986



CAMBRIDGE UNIVERSITY PRESS
CAMBRIDGE
LONDON NEW YORK NEW ROCHELLE
MELBOURNE SYDNEY

Published by the Press Syndicate of the University of Cambridge
The Pitt Building, Trumpington Street, Cambridge CB2 1RP
32 East 57th Street, New York, NY 10022, USA
10 Stamford Road, Oakleigh, Melbourne 3166, Australia

© Cambridge University Press, 1986

Printed in Great Britain by the University Press, Cambridge

COPYING

The *Journal* is registered with the Copyright Clearance Center, 21 Congress St., Salem, Mass. 01970. Organizations in the USA which are also registered with C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of US copyright law) subject to payment to C.C.C. of the per-copy fee of $05.00. This consent does not extend to multiple copying for promotional or commercial purposes. Code 0022-1120/86/4686-0001 $05.00.

ISI Tear Service, 3501 Market Street, Philadelphia, Pennsylvania 19104, USA is authorized to supply single copies of separate articles for private use only.

For all other use of material from the *Journal* permission should be sought from Cambridge or the American Branch of Cambridge University Press.

SUBSCRIPTIONS

The JOURNAL OF FLUID MECHANICS (ISSN 0022-1120) is published by the Cambridge University Press in 12 volumes each year. All orders must be accompanied by payment. Single volumes cost £29 net (US $66 in the USA and Canada) plus postage. The subscription price (which includes postage) to volumes 162–173, 1986, is £334 (US $760 in the USA and Canada) for institutions; £167 (US $380) for individuals. Copies of the journal for subscribers in the USA and Canada are sent by air to New York. Second class postage is paid at New York, NY, and at additional mailing offices. Claims for missing issues will be considered only if made immediately upon receipt of the subsequent issue. Copies of back numbers are available from Cambridge University Press. POSTMASTER: send address changes in USA and Canada to *Journal of Fluid Mechanics*, Cambridge University Press, 32 East 57th Street, New York, NY 10022.

Volume 167 June 1986

CONTENTS

Nonlinear model predictions of bispectra of shoaling surface gravity waves. STEVE ELGAR and R. T. GUZA *page* 1

Calculation of longitudinal shear dispersivity using an N-zone model as $N \to \infty$. S. C. CHIKWENDU 19

Boundary-layer separation of a two-layer rotating flow on a β-plane. LEE-OR MERKINE and LEONID BREVDO 31

Onset of surface-tension-driven Bénard convection. E. L. KOSCHMIEDER and M. I. BIGGERSTAFF 49

A study of singularity formation in a vortex sheet by the point-vortex approximation. ROBERT KRASNY 65

A moment model for vortex interactions of the two-dimensional Euler equations. Part 1. Computational validation of a Hamiltonian elliptical representation. M. V. MELANDER, N. J. ZABUSKY and A. S. STYCZEK 95

On hydromagnetic critical layers. I. A. ELTAYEB and M. H. A. HASSAN 117

The effect of particle interactions on dynamic light scattering from a dilute suspension. J. M. RALLISON and E. J. HINCH 131

Resonant amplification of gravity waves over a circular sill. JOHN W. MILES 169

Viscous fluid motion in a spinning and nutating cylinder. THORWALD HERBERT 181

Liquid-metal flow in a thin conducting pipe near the end of a region of uniform magnetic field. JOHN S. WALKER 199

A computer-controlled four-roll mill for investigations of particle and drop dynamics in two-dimensional linear shear flows. B. J. BENTLEY and L. G. LEAL 219

An experimental investigation of drop deformation and breakup in steady, two-dimensional linear flows. B. J. BENTLEY and L. G. LEAL 241

On long nonlinear internal waves over slope–shelf topography. KARL R. HELFRICH and W. K. MELVILLE 285

Rotating hydraulics of flow in a parabolic channel. KARIN BORENÄS and PETER LUNDBERG 309

On the nonlinear critical layer below a nonlinear unsteady surface wave. R. S. JOHNSON 327

Chaotic streamlines in the ABC flows. T. DOMBRE, U. FRISCH, J. M. GREENE, M. HÉNON, A. MEHR and A. M. SOWARD 353

Moving contact lines at non-zero capillary number. KALVIS M. JANSONS 393

Combustion theory: a report on Euromech 203. J. F. Clarke and N. Riley 409

Viscous interactions of many neutrally buoyant spheres in Poiseuille flow. Jeffrey A. Schonberg, Donald A. Drew and Georges Belfort 415

Energy of a system formed by a convective fluid and its container. M. Zamora and A. Rey de Luna 427

Fingering in Hele-Shaw cells. S. D. Howison 439

The drag on a sparse random array of fixed spheres in flow at small but finite Reynolds number. Yukio Kaneda 455

Resonant sloshing in shallow water. H. Ockendon, J. R. Ockendon and A. D. Johnson 465

Solidification of an alloy from a cooled boundary. M. Grae Worster 481

Experimental study of convective structures in rotating fluids. B. M. Boubnov and G. S. Golitsyn 503

Review

Fundamentals of Transonic Flow, by T. H. Moulden; Advances in Computational Transonics, by W. G. Habashi 533

Corrigendum 535

Index to Volume 167 536